

REMARKS

Applicants amend claim 1 to incorporate the limitation of claim 4. Claim 4 is canceled. Upon entry of this amendment, claims 1 and 5 are amended. No new matter is added. Claims 1-3 and 5-9 are pending, of which claims 1 and 5 are independent. Applicants respectfully submit that the pending claims define over the art of record.

Double Patenting

Claims 1-8 are rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-11 of United States Patent No. 6,874,588 in view of United States Patent No. 6,223,843 to O'Connell et al. Applicants submit herewith a terminal disclaimer to overcome the non-statutory obviousness-type double patenting rejection. Applicants respectfully request that the Examiner reconsider and withdraw the non-statutory obviousness-type double patenting rejection.

Claim Rejections Under 35 U.S.C. §103

Claims 1-9 are rejected under 35 U.S.C. §103(a) as being unpatentable over United States Patent No. 5,641,031 to Riemer et al. (hereafter "Riemer") in view of United States Patent No. 6,394,207 to Skala (hereafter "Skala") and in further view of United States Patent No. 6,223,844 to Greenhill (hereafter "Greenhill"). Applicants respectfully submit that the combination of the Riemer reference, the Skala reference, and the Greenhill reference do not teach or suggest the structural limitations provided by the claimed positioning of the different apparatuses.

Specifically, the prior art combination does not teach or suggest that the temperature regulating unit and the fuel cell output setting unit are aligned in a traverse direction of the vehicle so as to constitute a first group, and wherein the fuel supply regulating unit and the humidification unit are aligned in the traverse direction of the vehicle so as to constitute a second group, whereby the first group, the fuel cell, the second group and the exhaust unit are aligned in that order from a front to a rear of the vehicle, as required by independent claim 1. The combination of the three references also do not teach or suggest that the radiator, the temperature regulating unit and the fuel supply regulating unit are aligned in that order from a front to a rear of the vehicle, with the fuel storage unit being disposed rearward of the fuel supply regulating unit in a longitudinal direction of the vehicle, as required by independent claim

5. The combination of the prior art references also do not teach or suggest the limitation that the temperature regulating unit, the fuel cell, and the fuel supply regulating unit are accommodated in a fuel cell system box disposed on an underside of a floor of the vehicle, as required by independent claims 1 and 5.

The Claimed Invention

The claimed arrangement provides significant advantages that are not taught or suggested in the prior art. For example, the fuel cell system box as recited in both claims 1 and 5 protects the fuel cell and other apparatuses from exposure to external inputs, such as water, mud, and chipping, and the serviceability of these apparatuses for maintenance are improved. Additionally, the fuel cell system box is disposed underneath a vehicle that prevents damages from a head-on or rear-side collision of the vehicle.

In addition, the claimed invention provides in claim 1 that the temperature regulating unit and the fuel cell output setting unit are aligned in a traverse direction of the vehicle so as to constitute a first group, and the fuel supply regulating unit and the humidification unit are aligned in the traverse direction of the vehicle so as to constitute a second group. Such arrangement shortens the lengths of the first and second groups in the longitudinal direction of the vehicle. Additionally, by requiring the first group, the fuel cell, the second group and the exhaust unit to be aligned in that order from a front to a rear of the vehicle rather than collected at one location, more space can be provided in the passenger and luggage compartment. Moreover, since the humidification unit is disposed in the vicinity of the fuel cell, the length of the piping system connecting the humidification unit with the fuel cell can be decreased to a shortest dimension, and also since the humidification unit is accommodated in the fuel cell system box of encapsulated type, hydrogen humidified by the humidification unit can be supplied to the fuel cell before the hydrogen is cooled. Hence, hydrogen can be supplied to the fuel cell before water that is supplied through humidification is condensed.

Claim 2 provides that the humidification unit and the fuel supply regulating unit are interposed between the fuel tank and the fuel cell, the piping length of the hydrogen supply system is decreased to a shortest dimension and hence the quantity of hydrogen held within the piping of the hydrogen supply system is suppressed to a minimum level and the control response of the vehicle is improved.

Furthermore, the arrangement of the cooling fluid pipes allows heat exchanges between the cooling fluid pipes and the humidification unit or the fuel supply regulating unit improving the efficiency of temperature regulation of the entire fuel cell system. The arrangement of the cooling fluid pipes also shortens the lengths of the pipes and hence decreases the weight of the vehicle.

The Riemer Reference

The Riemer reference teaches an arrangement of components in an electric vehicle. Each component is designed as a separate unit so that the multiple components can be distributed over the available installation positions. A safety compartment is formed by beams 4, 5, 6, 7 and the fuel cell stack and the hydrogen temporary reservoir are preferably arranged in this safety compartment.

However, the Riemer reference does not teach or suggest a temperature regulating unit, a fuel supply regulating unit, or an exhaust unit and hence, the Riemer reference cannot teach or suggest the structural limitation that the temperature regulating unit and the fuel cell output setting unit *are aligned in a traverse direction of the vehicle* so as to constitute *a first group*, and the fuel supply regulating unit and the humidification unit *are aligned in the traverse direction of the vehicle* so as to constitute *a second group* and that the first group, the fuel cell, the second group, and the exhaust unit are aligned in that order from a front to a rear of the vehicle, as required by independent claim 1.

The Riemer reference also does not teach or suggest that the radiator, the temperature regulating unit, and the fuel supply regulating unit are aligned in that order from a front to a rear of the vehicle, as the Riemer reference only teaches the radiator and *not the temperature regulating unit or the fuel supply regulating unit*. Furthermore, the Riemer reference also does not teach or suggest that the temperature regulating unit, the fuel cell, and the fuel supply regulating unit are accommodated in a fuel cell system box disposed on an underside of a floor of the vehicle. The Riemer reference also teaches that a safety compartment formed by beams 4, 5, 6, 7, and not a box that encloses the temperature regulating unit, the fuel cell, and the fuel supply regulating unit.

Although the Riemer reference teaches selected component arrangements in an electric vehicle, the Riemer reference does not teach or suggest an arrangement such that the piping

length of the hydrogen supply system is decreased to a shortest dimension and hence the quantity of hydrogen held within the piping of the hydrogen supply system is suppressed to a minimum level and the control response of the vehicle is improved. The Riemer reference further does not teach or suggest arrangements of cooling fluid pipes such that heat exchange is allowed between the cooling fluid pipes and the fuel supply regulating unit or the humidification unit.

The Skala Reference

The Examiner looks to the teachings of the Skala reference and the Greenhill reference to compensate for the deficiencies of the Riemer reference. However, even in combination, the references fail to anticipate the invention. Moreover, there would be no motivation to one of ordinary skill in the art to modify the vehicle described in Riemer using the teachings of the Skala reference and the Greenhill reference.

According to the Examiner, because the Skala reference describes a fuel cell system including a controller for controlling the temperature of the system, it would be obvious to modify the system of Riemer to include a thermoregulator. However, the Skala reference does not teach or suggest *the positioning of the thermoregulator*. Hence, even in combination with the Riemer reference, the references still fail to teach or suggest that the temperature regulating unit and the fuel cell output setting unit are aligned in a traverse direction of the vehicle so as to constitute a first group and that the first group and the fuel cell are aligned in that order from a front to a rear of the vehicle, as required by independent claim 1. Furthermore, the combination also does not teach or suggest that the radiator and the temperature regulating unit are aligned in that order from a front to a rear of the vehicle, as required by independent claim 5, and the limitation that both the temperature regulating unit and the fuel cell are accommodated in a fuel cell system box, as required by independent claims 1 and 5. The Skala reference also does not teach or suggest arrangements of cooling fluid pipes such that heat exchange is allowed between the cooling fluid pipes and the fuel supply regulating unit or the humidification unit.

The Greenhill Reference

According to the Examiner, because the Greenhill reference teaches bypass valves 138, 19 to divert the oxidant stream away from the fuel cell stack if desired, and exhaust manifold 215 to directing fluids away from the fuel cell stacks, it would be obvious to modify the system

of Riemer to include a fuel supply regulating unit and an exhaust unit. However, the Greenhill reference teaches the exhaust manifold 215 to be adjacent to the fuel cell stack and not at a rear of the vehicle. The teachings of the Greenhill reference suggest that fewer motors should be used to drive separate apparatuses in the vehicle and hence a mechanism including external belt drives, internal gear, and chain drives, are used so that a single motor 220 can drive many apparatuses, such as air compressor 230, pump 240, air break compressor 264, alternator 266, air conditioning compressor 274 and pumps 284. See Fig. 3 and related text. Hence, the teachings of the Greenhill reference require grouping all these apparatuses in one location so that they can all be coupled to one motor.

Therefore, even the Reimer reference is combined with the Greenhill reference and the Skala reference, the combination still fails to teach or suggest *the fuel supply regulating unit and the humidification unit are aligned in the traverse direction of the vehicle so as to constitute a second group, and distributing the fuel cell, the second group and the exhaust unit so that they are aligned in that order from a front to a rear of the vehicle*, as required by independent claim 1. Furthermore the combination does not teach or suggest that the radiator, the temperature regulating unit and the fuel supply regulating unit are distributed and aligned in that order from a front to a rear of the vehicle, as required by independent claim 5, or the limitation that the temperature regulating unit, the fuel cell, and the fuel supply regulating unit are accommodated in a fuel cell system box disposed on an underside of a floor of the vehicle, as required by independent claims 1 and 5. Additionally, the Greenhill reference does not teach or suggest arrangements of cooling fluid pipes such that heat exchange is allowed between the cooling fluid pipes and the fuel supply regulating unit or the humidification unit.

In fact, the grouping of the apparatuses to couple to one motor as taught by the Greenhill reference will defeat the objective of the Reimer reference to build different apparatuses as separate units and distribute them under a floor of the vehicle. Hence, there is no motivation to combine the Reimer reference with the Greenhill reference.

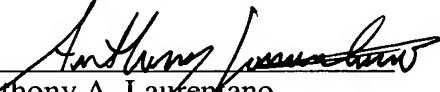
CONCLUSION

In view of the above amendment, Applicants believe the pending application is in condition for allowance.

Applicants submit herewith a terminal disclaimer, a third supplemental Information Disclosure Statement, and a petition for one-month extension of time. Applicants believe no other fee is due. However, if additional fee is due, please charge our Deposit Account No. 12-0080, under Order No. NGW-012 from which the undersigned is authorized to draw.

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Respectfully submitted,

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